United States Patent [19]

Washington

[11] **4,063,374**

[45] **Dec. 20, 1977**

[54] **GRAVE OPENING AND CLOSING MACHINE**

[76] Inventor: **Corinthian Washington**, P.O. Box 646, Mansfield, La. 71052

[21] Appl. No.: **747,316**

[22] Filed: **Dec. 3, 1976**

[51] **Int. Cl.**[2] **E02F 5/22**

[52] **U.S. Cl.** ..... **37/142.5**; 37/DIG. 6; 214/138 C; 214/146.5

[58] **Field of Search** ..... 37/142.5, DIG. 6, 103, 37/2 R, 183 R–188; 214/146.5, 138 C, 131 A, 138 R, 147 R; 294/70, 88

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Primary Examiner—E. H. Eickholt
Attorney, Agent, or Firm—Clarence A. O'Brien; Harvey B. Jacobson

[57] **ABSTRACT**

A wheeled vehicle is provided including a plurality of plan area peripheral portions. A generally horizontal support beam is pivotally supported from the vehicle with one end of the beam projecting outwardly of one peripheral portion of the vehicle and vertical oscillation of the one end of the beam relative to the vehicle. A first motor is connected between the beam and the vehicle for effecting selected angular displacement of the beam relative to the vehicle and an upstanding support structure is pivotally supported at its upper end from the one end of the beam for angular displacement relative to the beam about a horizontal axis extending transversely of the beam. A downwardly opening clam-type digging head is carried by the lower end of the support structure and a second motor is connected between the beam and the support structure for angularly displacing the support structure relative to the beam.

9 Claims, 5 Drawing Figures

Fig. 1

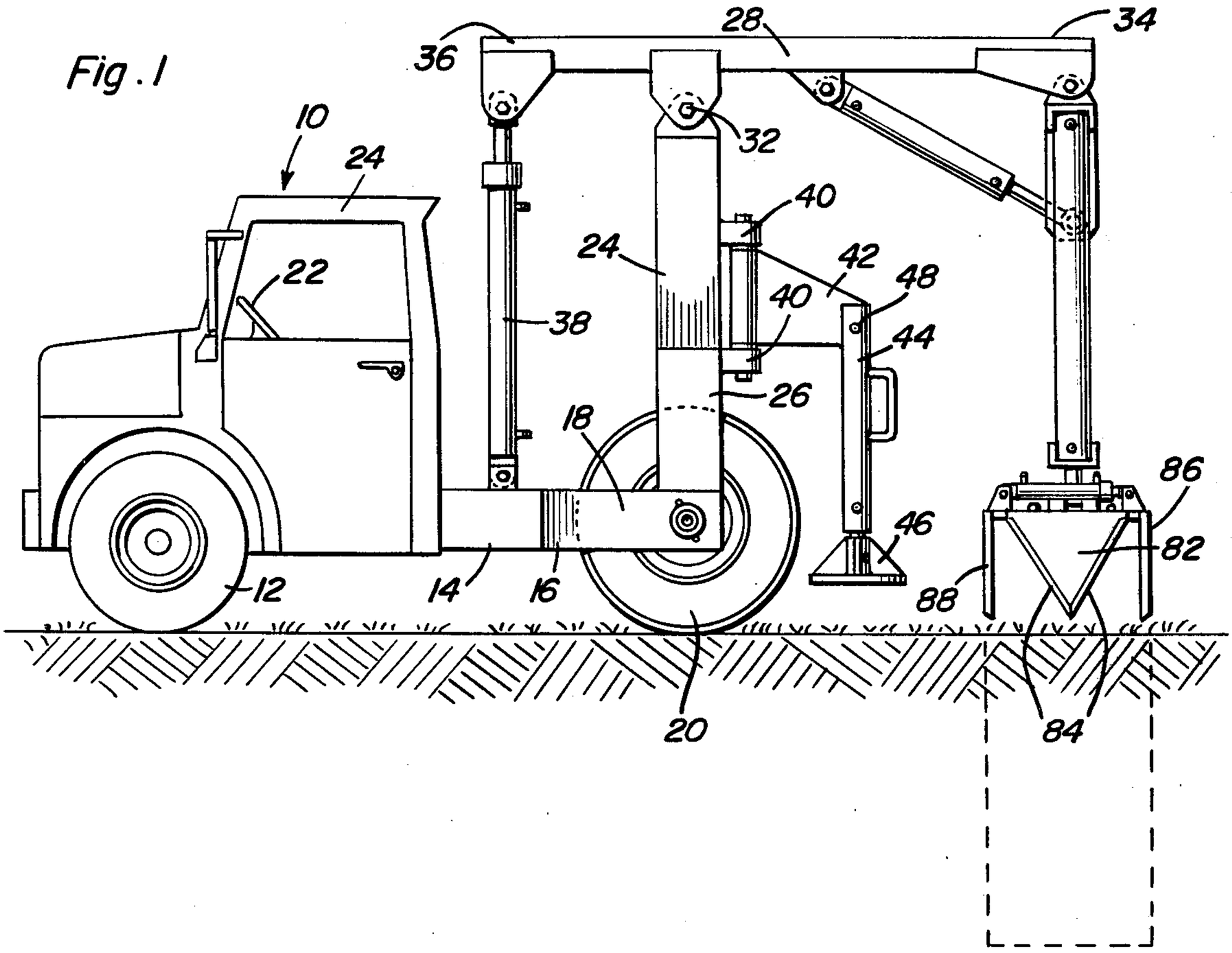
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Fig. 2

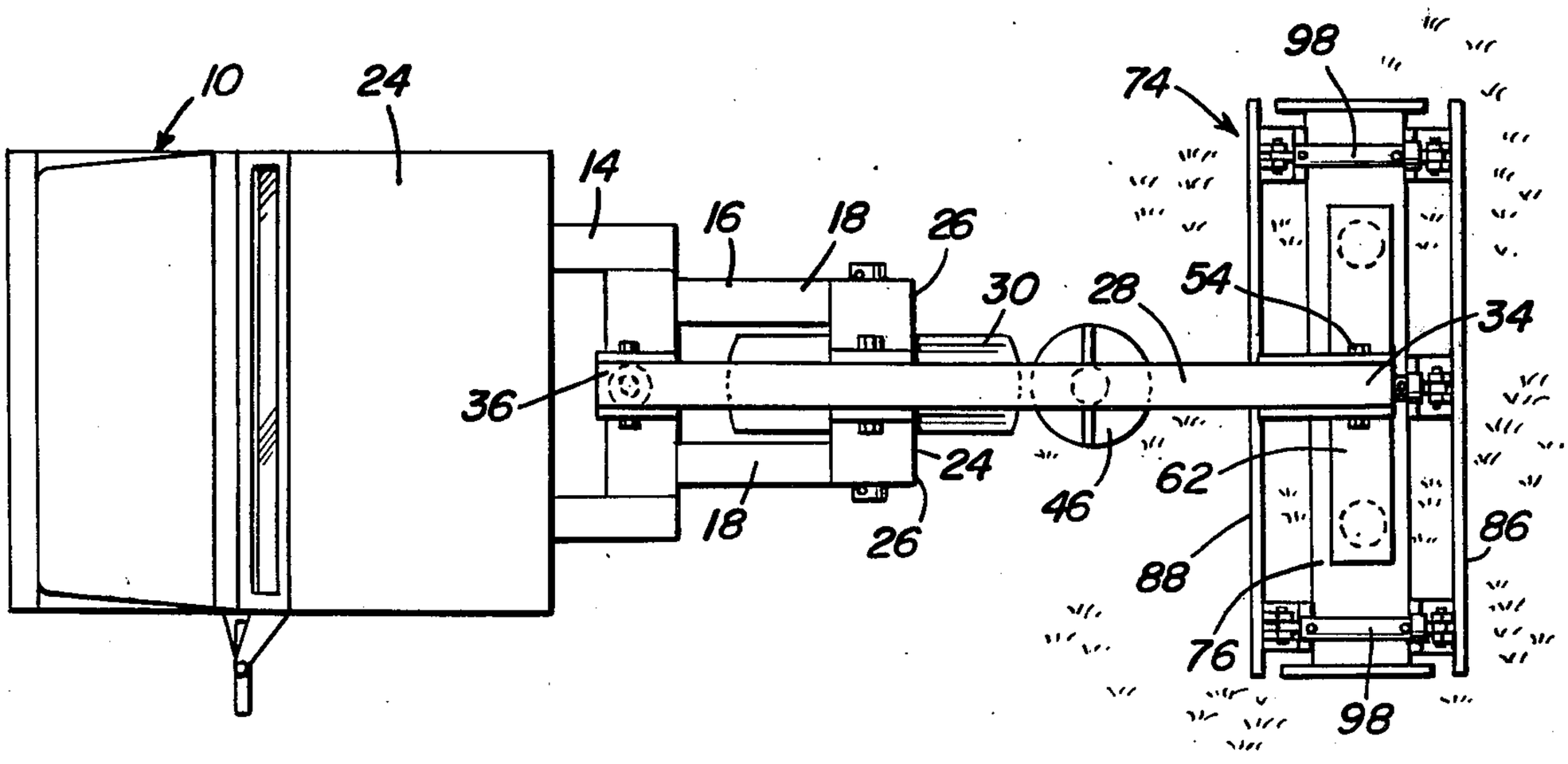
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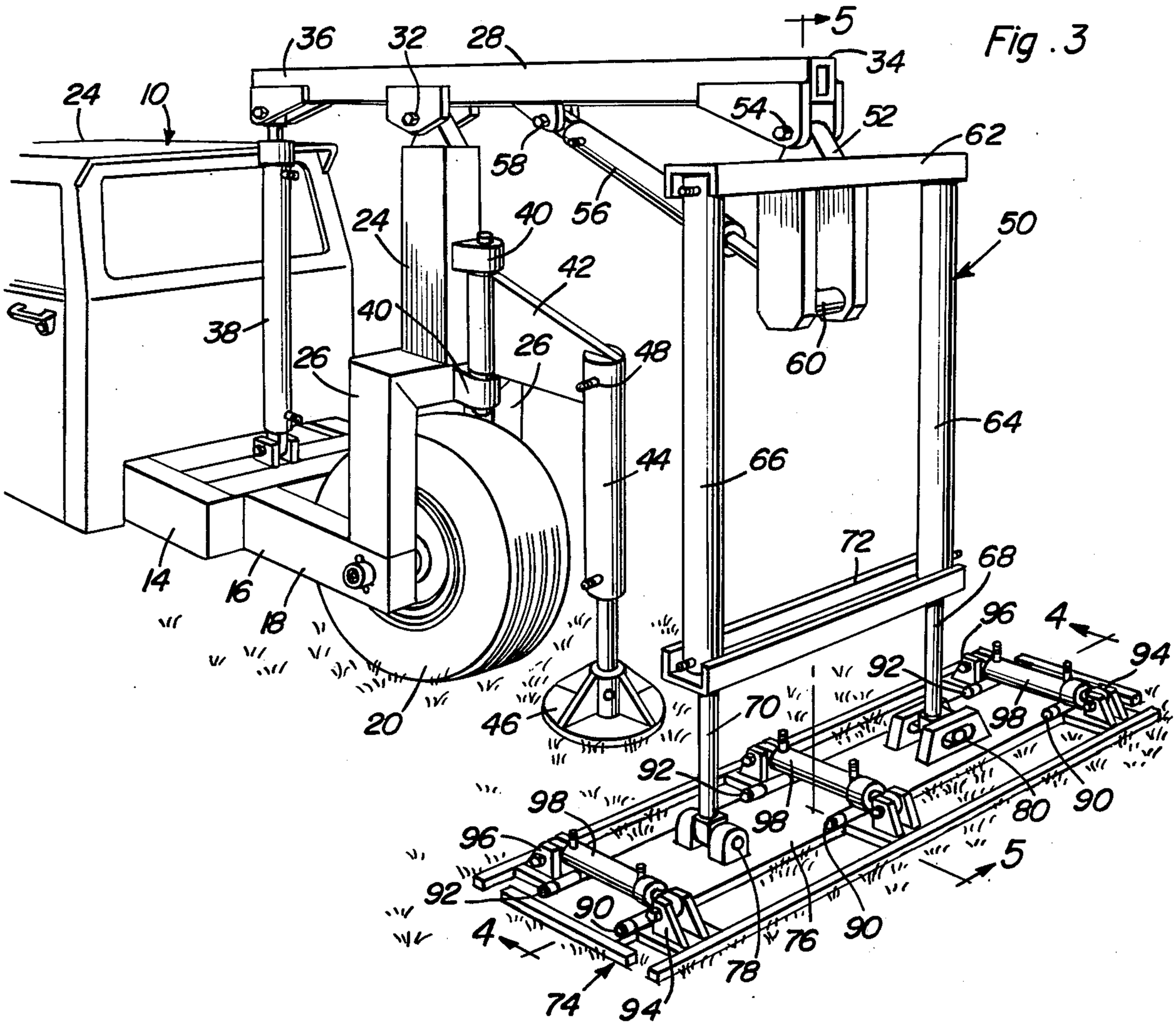
Fig. 3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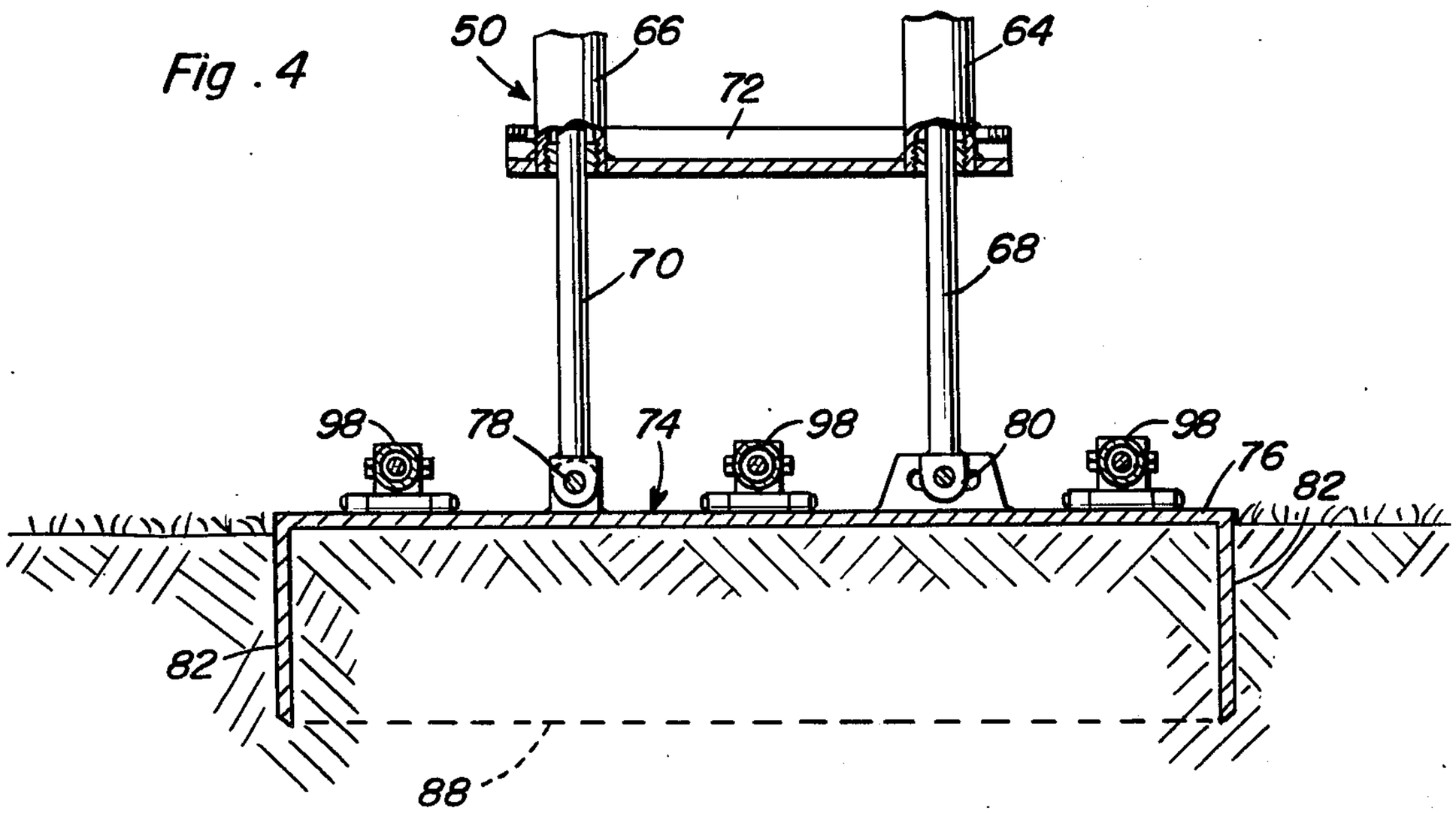
74

Fig. 4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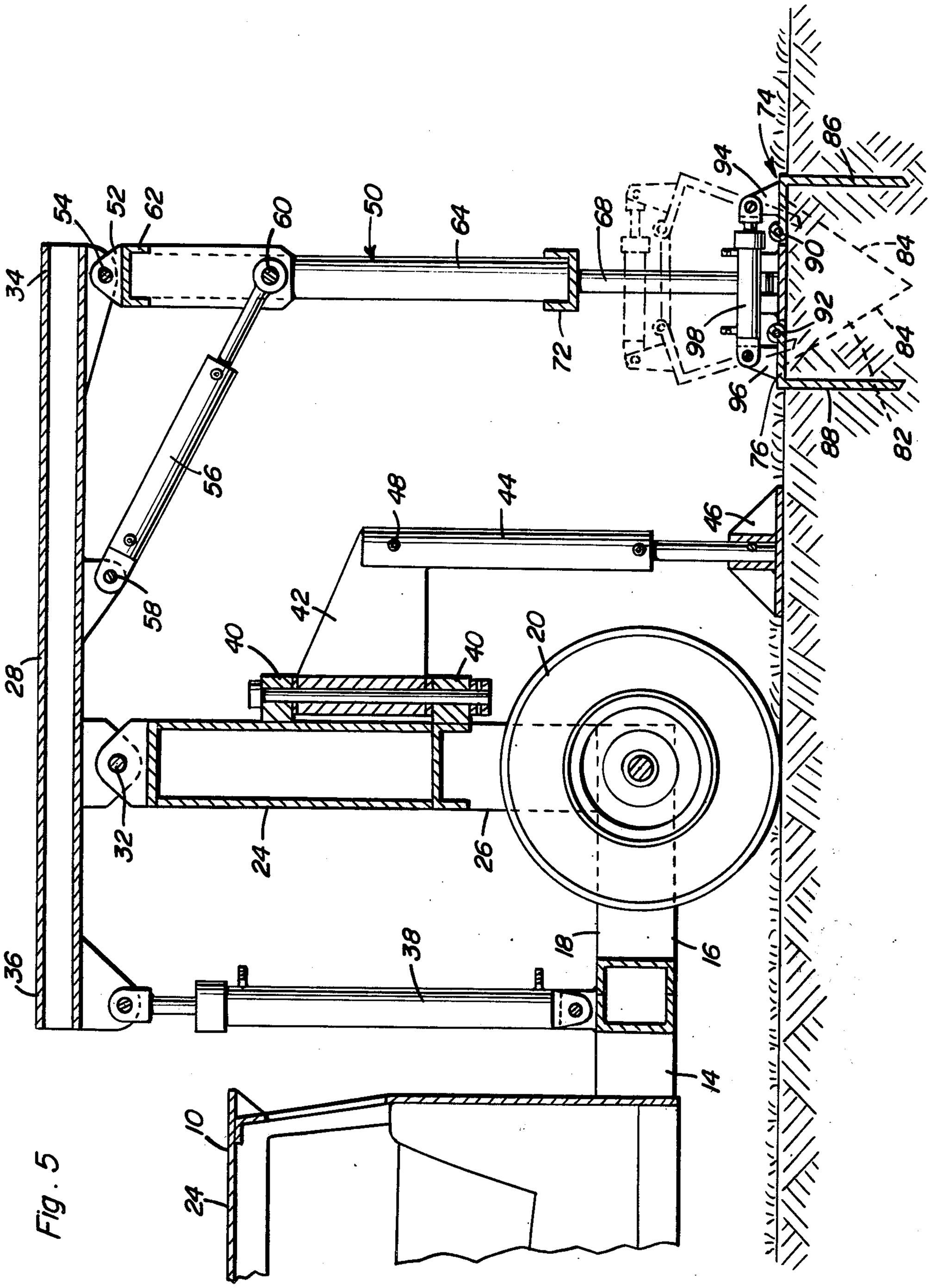
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Fig. 5

GRAVE OPENING AND CLOSING MACHINE

BACKGROUND OF THE INVENTION

Various forms of mobile structures have been heretofore provided for the purpose of opening and closing graves. However, most of these structures are of a type rendering them difficult to maneuver in cemeteries between grave plots and others include digging structure which renders a grave digging operation difficult. Accordingly, a need exists for a mobile grave digging apparatus having high mobility and which may also be utilized to efficiently dig a grave.

Examples of previously known grave diggers and other excavating equipment including some of the general structural and operational features of the instant invention are disclosed in U.S. Pat. Nos. 2,770,057, 3,191,982, 3,344, 539, and 3,669,285.

BRIEF DESCRIPTION OF THE INVENTION

The grave digging apparatus of the instant invention utilizes a mobile frame of the self-powered type and which may be readily driven throughout a cemetery with ease and at a rate of speed at least equal to the speed of other forms of vehicular traffic which may occur in a cemetery. The grave digger is further constructed in a manner whereby it may be readily maneuvered into position for digging a grave and is further provided with grave digging structure operative in a reasonably quiet manner and to dig a grave of substantially retangular plan shape and including substantially vertical sides.

The main object of this invention is to provide a grave digging apparatus which may be readily maneuvered into a desired grave digging position.

Another object of this invention is to provide a grave digger of a highly maneuverable type and which may be readily driven, in a self-propelled manner, from one grave site to another at speeds equivalent to at least average vehicular speed in a cemetery. Still another object of this invention is to provide a grave digging apparatus which may be operated in a reasonably quiet manner to dig a grave.

Yet another important object of this invention is to provide a grave digger which will be capable of digging a grave of substantially rectangular plan shape and which includes substantially vertical sides.

A further object of this invention is to provide a grave digger which may be operated by personnel having only a minimum amount of experience in operation of the grave digging apparatus.

A final object of this invention to be specifically enumerated herein is to provide a grave digger in accordance with the preceding objects and which will conform to conventional forms of manufacture, be of simple construction and easy to use so as to provide a device that will be economically feasible, long lasting and relatively trouble free in operation.

These, together with other objects and advantages which will become subsequently apparent, reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a side elevational view of the grave digging apparatus of the instant invention with the grave digging head thereof in position to dig a grave;

FIG. **2** is a top plan view of the assemblage illustrated in FIG. **1**;

FIG. **3** is a fragmentary, perspective view of the grave digging apparatus with the grave digging structure thereof in position making the initial thrust into the ground to dig a grave;

FIG. **4** is an enlarged, fragmentary vertical sectional view taken substantially upon the plane indicated by the section line **4—4** of FIG. **3**; and

FIG. **5** is an enlarged, fragmentary longitudinal vertical sectional view taken substantially upon the plane indicated by the section line **5—5** of FIG. **3**.

DETAILED DESCRIPTION OF THE INVENTION

Referring now more specifically to the drawings, the numeral **10** generally designates the grave digging apparatus of the instant invention. The apparatus **10** includes a mobile vehicle having steerable and drivable wheels **12** at one end thereof, and a horizontally outwardly projecting frame portion **14** at the other end thereof. The frame portion **14** includes a bifurcated outer end **16** between whose furcations **18** a single and centrally disposed wheel **20** is journaled. The wheels **12** comprise opposite side wheels and may be steered by a conventional steering wheel **22** located in the operator's cab **24** of the vehicle **10**.

The bifurcated end portion **16** of the frame portion **14** includes an upstanding support **24** whose lower end is bifurcated and includes opposite side furcations **26**. The lower ends of the furcations **26** are anchored and supported from the free ends of the furcations **18**.

A horizontal beam **28** is pivotally supported, intermediate its opposite ends, from the upper end of the support **24** for oscillation about a horizontal transverse axis as at **32** and one end **34** of the beam **28** projects horizontally outwardly of the end of the vehicle **10** remote from the wheels **12**. The other end **36** of the beam **28** overlies the frame portion **14** and an extendable fluid motor **38** is connected between the frame portion **14** and the other end **36** of the beam **28** whereby oscillation of the beam **28** in a vertical plane may be effected by operation of the motor **38**.

The support **24** includes a pair of vertically spaced journaled blocks **40** between which the inner end of a horizontally outwardly projecting arm **42** is pivotally mounted for oscillation of the arm **42** about a vertical axis. The outer end of the arm **42** has a vertically extendable landing leg assembly **44** supported therefrom and the lower end of the landing leg assembly **44** includes a horizontally enlarged foot **46** for engagement with the ground. The upper end of the landing leg assembly **44** is pivotally attached to the arm **42** as at **48** and the landing leg assembly **44** comprises a hydraulic cylinder which may be actuated to downwardly extend the foot **46**.

With attention now invited more specifically to FIG. **3** of the drawings, an upstanding support structure referred to in general by the reference numeral **50** is provided and includes an upper mounting portion **52** which is pivotally supported from the outer end **34** of the beam **28** as at **54** for oscillation of the support structure **50** about a horizontal transverse axis. An inclined extend-

able fluid motor **56** has its opposite ends pivotally connected to the beam **28** as at **58** and to the support structure **50** as at **60** whereby the fluid motor **56** may be extended and retracted to oscillate the support structure **50** in a vertical plane about a horizontal, transverse axis. The support structure **50** includes an upper transverse member **62** from which the mounting portion **52** is supported and a pair of depending opposite side hydraulic cylinders **64** and **66** including downwardly extendable and upwardly retractable lower end piston rod portions **68** and **70**. A lower transverse brace **72** corresponding to the brace **62** extends between and rigidly connects the lower ends of the cylinders **64** and **66** and the lower ends of the piston rods **68** and **70** support a downwardly opening clam-type digging head referred to in general by the reference numeral **74** therefrom. The digging head **74** includes an elongated horizontally disposed mounting portion **76** to one end portion of which the lower end of the piston rod **70** is pivotally secured as at **78**. The lower end of the piston rod portion **68** enjoys a pin and slot-type pivotal connection **80** with the other end of the mounting portion **76**.

The opposite ends of the mounting portion **76** include depending transverse triangular digging blades **82** including sharpened downwardly convergent cutting edges **84** and the opposite side longitudinal portions of the elongated mounted portion **76** include depending cutting blades **86** and **88** pivotally supported therefrom as at **90** and **92**. The blades **86** and **88** include upwardly projecting mounting portions **94** and **96** between which a plurality of extendable and retractable fluid motors **98** are connected whereby the digging blades **86** and **88** may be swung between the vertical positions thereof illustrated in FIG. **5** and downwardly convergent positions as a result of extension of the fluid motors **98** with the blades **86** and **88** generally paralleling corresponding pairs of the digging edges **84** of the blades **82**.

As hereinbefore set forth, the vehicle **10** may be driven by an operator from within the cab **24**. The wheels **12** comprise both driving and steering wheels and the vehicle **10** may be driven in either direction.

After the vehicle **10** has been moved into position with the grave to be dug immediately beneath the digging head **74** in the manner illustrated in FIG. **1** of the drawings, the arm **42** is swung to the desired position and the landing leg assembly **44** (comprising an extendable fluid cylinder) is actuated to lower the foot **46** into contact with the ground. Then, the cylinders or fluid motors **38, 56, 64, 66** and **98** may be actuated in order to drive the digging head **74** downward into the ground and to cause the digging blades **86** and **88** to swing toward downwardly convergent positions whereby the portions of the ground disposed between the blades **82, 86** and **88** may be lifted from the ground. Repeated operation of the digging head **74** in this manner will, of course, enable a suitable size grave to be dug.

The digging head assembly **74** may have an effective length between the blades **82** of substantially 8 feet and an effective width between the blades **86** and **88** of substantially 3 feet. Of course, the digging head **74** may be operated to dig a hole in the ground of at least 4 feet in depth.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly all suitable modifications and equivalents may be resorted to, falling within the scope of the invention.

What is claimed as new is as follows:

1. In combination, a wheeled vehicle including a plurality of peripheral portions, a generally horizontal support beam pivotally supported from said vehicle with one end thereof projecting outwardly of one peripheral portion of said vehicle and vertical oscillation of said one end of said beam relative to said vehicle, first motor means connected between said beam and said vehicle for effecting selected angular displacement of said beam relative to said vehicle, an upstanding support structure pivotally supported at its upper end from said one end of said beam for angular displacement relative thereto about a horizontal axis extending transversely of said beam, a downwardly opening clam-type digging head carried by the lower end of said support structure, second motor means connected between said beam and said support structure for angularly displacing the latter relative to the former, said support structure including a pair of parallel elongated and independently longitudinally extendible upstanding support members suitably rigidly interconnected at their upper end portions for swinging in unison about said horizontal transverse axis and with said support members spaced apart in a direction paralleling said axis, said head including an elongated mounting portion paralleling the axis of oscillation of said support structure relative to said one end of said beam, said mounting portion including opposite side longitudinal marginal portions having depending digging blades supported therefrom for angular displacement about axes extending longitudinally of said longitudinal marginal portions, motor means operatively connected between said depending blades for pivoting the latter toward downwardly convergent positions, the lower end portions of said support members being pivotally anchored to longitudinally spaced midportions of said mounting portion of said head for oscillation relative thereto by pivot connections defining axes of oscillation extending transversely of said mounting portion and disposed at generally right angles relative to said support members and said horizontal transverse axis, one of said pivot connections including means operative to allow shifting of the corresponding axis relative to and longitudinally of said head.

2. The combination of claim **1** wherein the other end of said beam projects outwardly of the side of the horizontal axis of oscillation of the beam relative to the vehicle remote from said one end of said beam, said first motor means comprising an upstanding hydraulic cylinder pivotally connected between said other end of said beam and said vehicle.

3. The combination of claim **1** wherein said support members include upper and lower relatively extendable and retractable end portions and motor means operatively connected between said upper and lower end portions for effecting relative extension and retraction thereof.

4. The combination of claim **1** wherein said elongated mounting portion includes opposite end depending transverse blades.

5. The combination of claim **4** wherein said transverse blades include downwardly convergent cutting edges.

6. The combination of claim **1** wherein said vehicle includes a pair of opposite end portions and a pair of opposite side steerable and drive wheels disposed at one end of the portion of said vehicle, said one end of said

beam projecting endwise outwardly of the other end of said vehicle.

7. The combination of claim 6 wherein said other end of said vehicle includes a single centrally located support wheel.

8. The combination of claim 6 wherein said other end of said vehicle includes a horizontal arm having one end portion thereof supported from said vehicle for angular displacement about an upstanding axis, the other end of said arm having a depending and downwardly extendable landing leg assembly supported therefrom.

9. A grave digger including a vehicle, a downwardly opening clam-type digging head, means supporting said head from said vehicle for vertical shifting relative thereto outwardly of one marginal side of said vehicle, said head including an elongated horizontal mounting portion opposite side marginal portions having depending parallel generally rectangular digging blades supported therefrom for angular displacement about axes extending longitudinally of said mounting portion, motor means operatively connected between said depending blades for pivoting the latter toward downwardly convergent positions, said elongated mounting portion including fixed opposite end depending transverse blades, said transverse blades including downwardly convergent cutting edges which closely parallel the upstanding end edges of said rectangular blades when the latter are disposed in their downwardly convergent positions.

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